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Internal Audit Data Analytics

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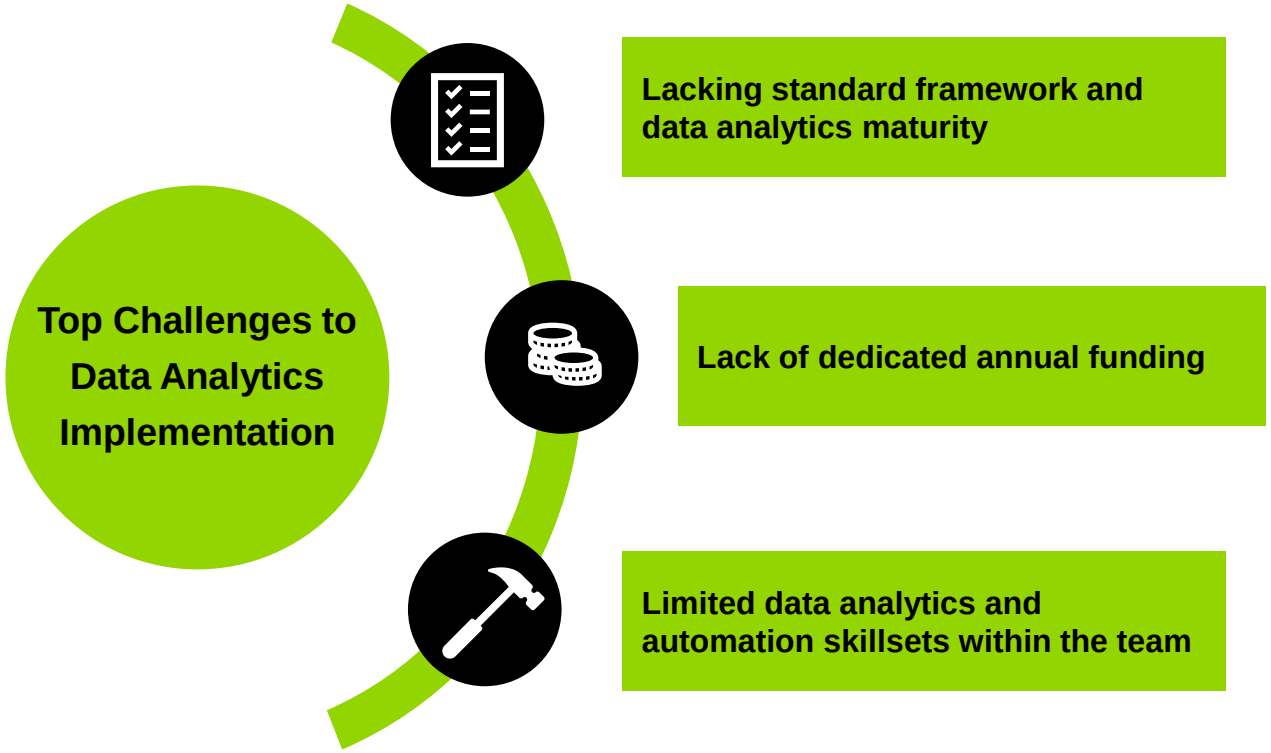
Agenda Items

- Current State of Analytics in the Industry
- Drivers for Data Analytics and Automation
- Analytics Point of View across three Lines of Defense
- Internal Audit Data Analytics Maturity Scale
- Data Analytics and Automation Framework
- Team Structuring
- Considerations for Data Analytics
- Typical Methodology
- Typical Data Analytics Process
- Typical Training and Common Tools in the Market
- Use Case Examples
- Questions

Current state of Data Analytics and Automation

Organizations are gaining familiarity with the benefits of data analytics and automation. Many have identified processes that could benefit from automation, but face challenges and constraints with implementation.



Polling Question 1:

What are some of the challenges faced by your organization to integrate analytics within the Internal Audit function?

A. Lack of dedicated annual budget for data analytics

B. Lack of standard framework to integrate analytics

C. Limited data analytics and automation skillsets

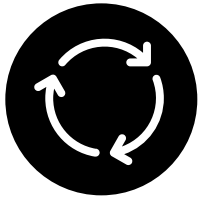
D. All of the above

Drivers for Data Analytics and Automation

Internal Audit / Controls functions are under pressure to perform more work with constrained/limited resources, resulting in multiple drivers to integrate data analytics and automation in audit life cycle.

Cost Effectiveness

- ❑ Ability to automate tests where data is available
- ❑ Ability to use open-source software to reduce licensing costs
- ❑ Potentially provide ability to execute more audits



Efficiency and Optimization

- ❑ Develop repeatable codes and scripts to enhance efficiency and optimization of audits over time
- ❑ Reduce manual tasks within an audit (i.e., automate data gathering vs manual copying and pasting from multiple date sources)
- ❑ Develop repeatable tests and analysis for Continuous Monitoring of high-risk areas

Ability to test larger population (100% in some case)

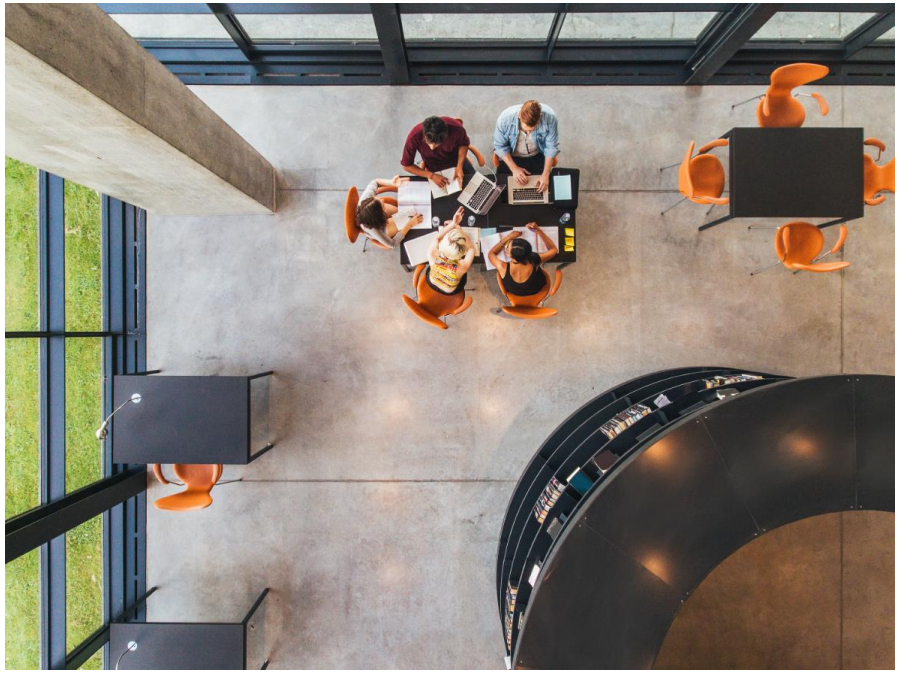
- ❑ Ability to perform exploratory data analysis during audit planning phase to understand trends, anomalies and potential outliers
- ❑ Depending on data quality and availability, ability to test entire populations during fieldwork

Increasing Assurance Scale

- ❑ Using Data analytics and automation auditors are able to provide results and audit opinions supported by facts supported with data
- ❑ Ability to execute targeted testing based on potentially high-risk areas using data exploration/ data profiling techniques
- ❑ Ability to execute testing on 100% population could assist in providing higher level of assurance

Analytics Point of View across 3 Lines of Defense

The three line of defense at an organization work together to minimize risks across the organization. With each line of defense playing, its own unique role – they all have different data analytics needs.



First line of defense (Program Office / Process Owners)

Management has the primary responsibility to own and manage risks associated with daily operational activities. Management is also responsible for design, implementation and operation of controls. The data analytics needs they may have will be different from second and third line of defense. Management might be more interested in executing analytics driven approach which may help them understand overall operational landscape, areas where controls are catching issues / root causes and leveraging those insights to mitigate them before they become enterprise-wide issues.

Second line of defense (OCFO / OCRO)

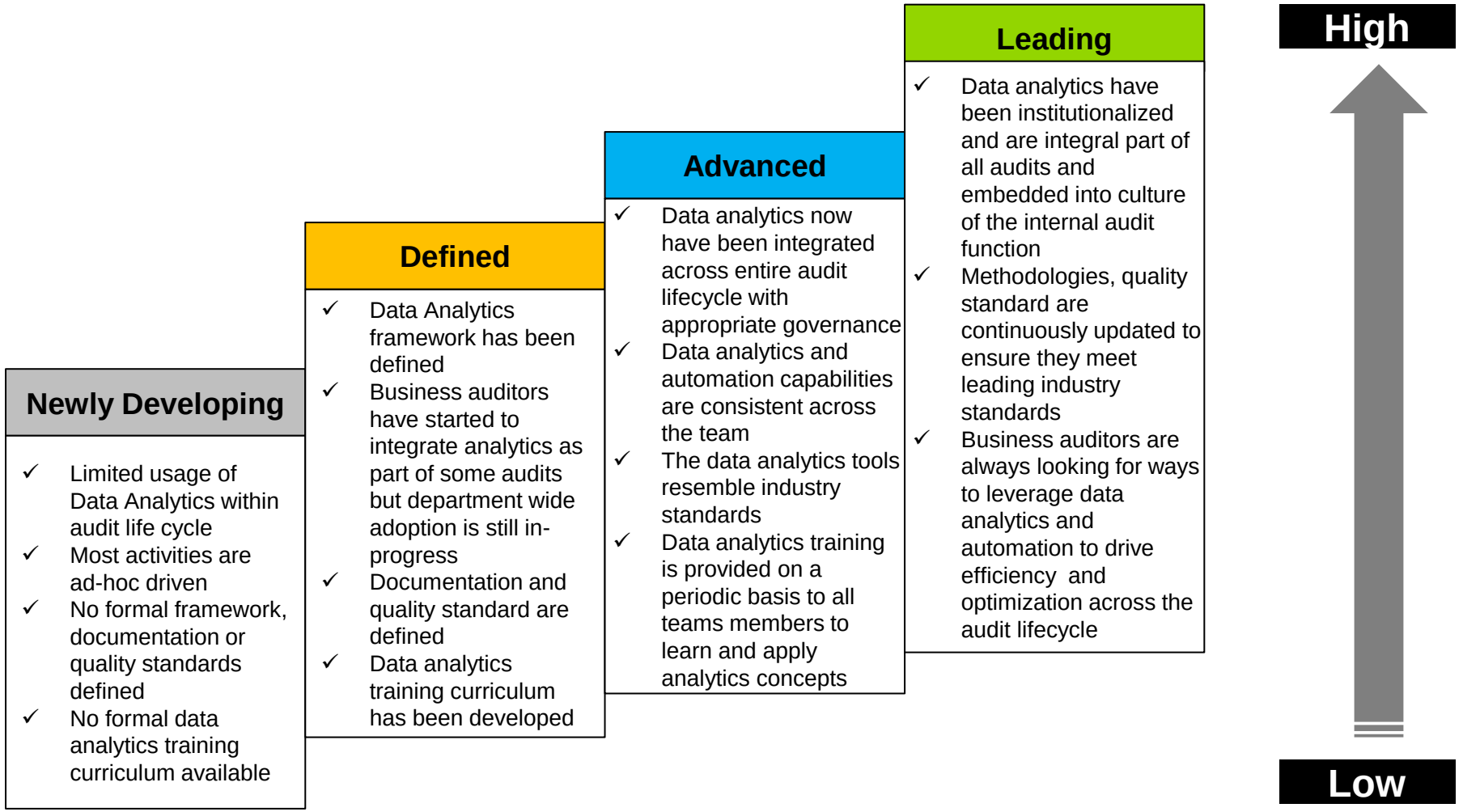
Second line of defense is primary responsible for defining policies and compliance frameworks and responsible to ensure the enterprise remains compliant with those policies. The data analytics needs for second line defense would be more compliance driven in nature (for example if there are certain third party / vendor risk management policies defined), second line of defense could work on developing vendor risk score management system based on business rules and identify any non-compliance issues. Second line of defense could leverage sophisticated data analytics and automation technology such as robotic process automation, optical character resolution or natural language process techniques to ensure compliance and minimize risk to the organization.

Third line of defense (OIG)

Third line of defense is primary responsible for providing independent assurance that first and second line of defense are operating effectively and minimizing risk for the organization. The type of analytics leveraged by Internal Audit would be more focused on data profiling / data exploration to identify potential high-risk areas in an audit which can help auditors leverage limited resource and budget more efficiently and effectively. Internal audit would typically leverage scripting tools to test entire data populations to identify issues / observations. It allows internal auditors to test larger samples, more targeted high-risk areas in a cost-effective way.

Internal Audit Analytics Maturity

Guidehouse has a defined internal audit data analytics maturity scale which resembles industry standards and provides guidance into where an organization might be with respect to data analytics maturity within their internal audit function.



Polling Question 2:

Where on the data analytics maturity scale do you think your organization currently fits?

A. Newly Developing

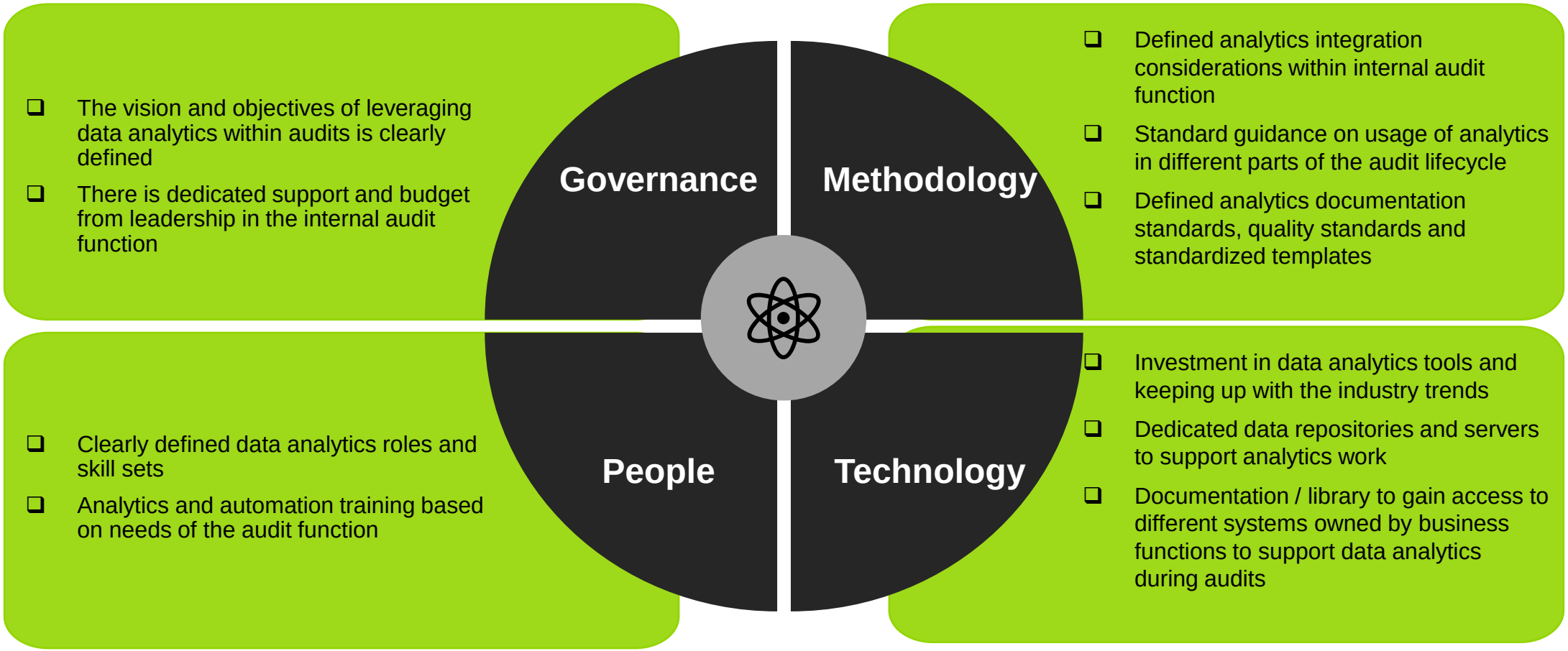
B. Defined

C. Advanced

D. Leading

Data Analytics and Automation Framework

The Data Analytics and Automation framework shown below can help implement a successful Internal Audit Analytics program within an IA function.



Team Structuring

There are two types of common teaming structures to integrate data analytics team in an Internal Audit function.

Centralized Team Structure

- Data analytics is a stand-alone team within Internal Audit function
- The data analytics team gets engaged by the business audit teams during audits
- Business auditors are expected to provide guidance and insights with respect to business knowledge associated with the audit
- Leadership team within Internal Audit Analytics is responsible for ensuring defined quality and documentation standards are met

Partnership and collaboration between business auditors and data analytics team within Internal Audit Function

Hybrid Team Structure

- The data analytics resources are embedded in respective business audit teams so they can specialize in certain business areas
- Data analytics team members are expected to have knowledge of the business areas they are supporting
- Data analytics leadership is responsible for ensuring defined quality and documentation standards are met

Polling Question 3:

Has your organization defined any formal team structure for data analytics integration?

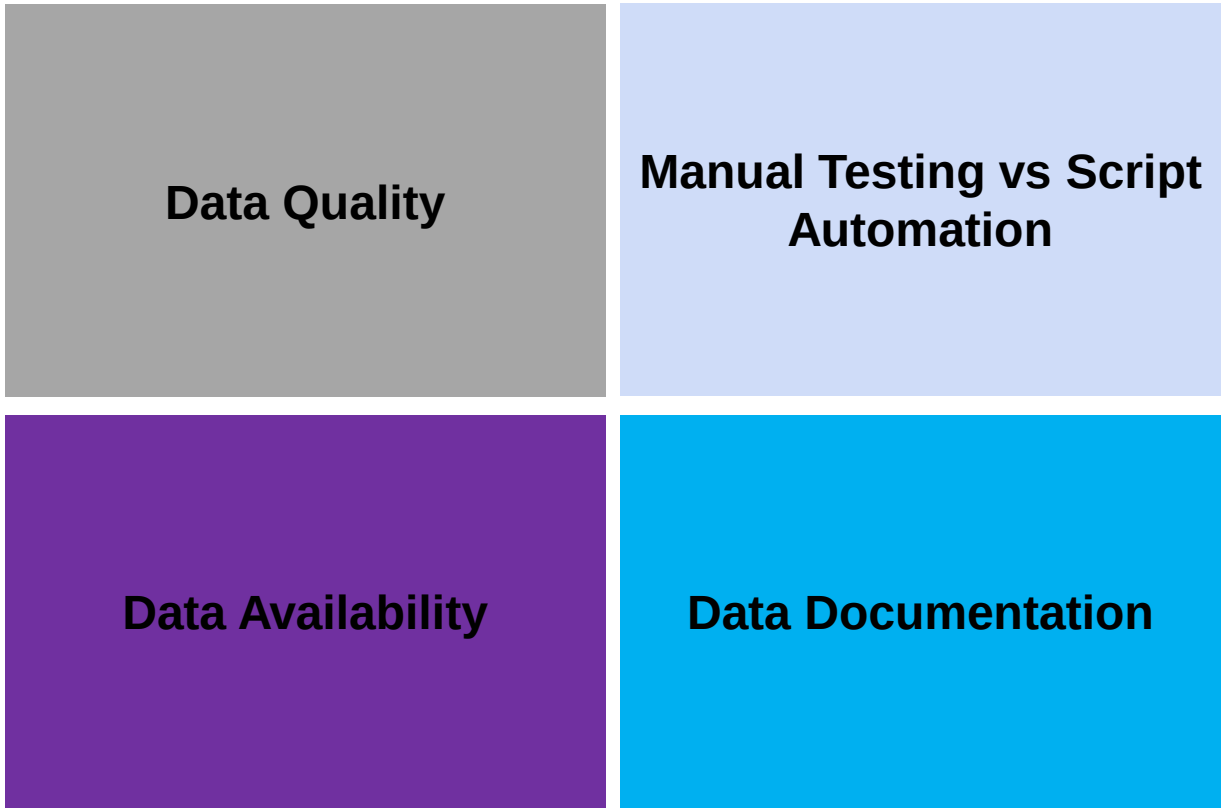
A. Yes

B. No

Considerations for usage of Data Analytics in an Audit

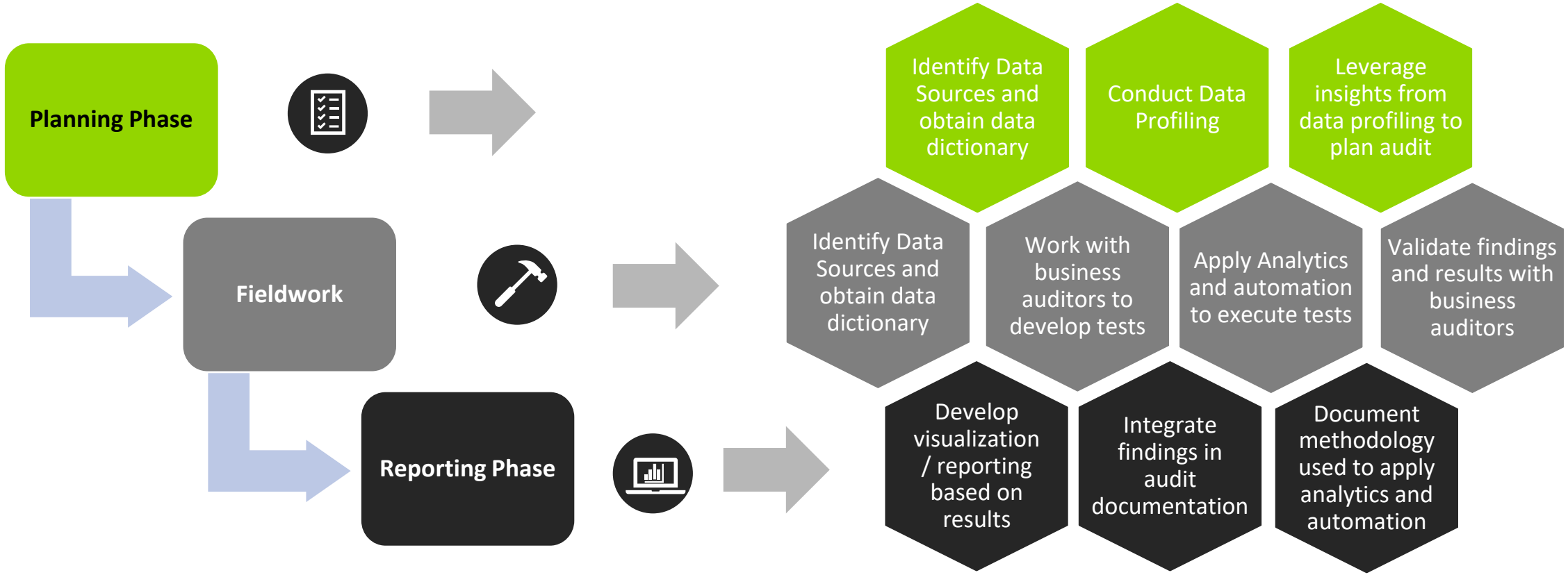
The business audit teams should take certain factors under consideration before deciding on usage on analytics as part of the audit. Primarily considerations would be:

- ✓ The quality of data that is available
- ✓ Ease of access and data availability (structured vs unstructured data)
- ✓ Time to develop automation and data analytics scripts/codes vs manual testing
- ✓ Availability of data library / documentation to understand data elements



Data Analytics Integration Approach in an Audit Lifecycle

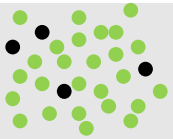
Below steps outline typical approach on how to integrate analytics within an audit lifecycle.



Typical Data Analytics Process

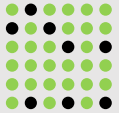
The steps below highlight a typical data analytics / data exploration process works.

Raw Data



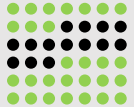
- ✓ Identification of data sources
- ✓ Obtaining data dictionaries
- ✓ Getting the right access

Data Management



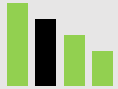
- ✓ Preparing data / cleansing
- ✓ Data validation, structuring and extraction
- ✓ Data transformation and loading or preparing data for analysis

Data Analysis



- ✓ Perform exploratory data analysis to identify any:
  - ❑ Trends
  - ❑ Anomalies / Outliers
  - ❑ Looking for patterns
- ✓ Execute audit tests on entire data populations
- ✓ Apply any automation techniques (i.e. RPA) to optimize the process for repeatability and continuous monitoring

Data Visualization



- ✓ Develop interactive data visualizations
- ✓ Draw conclusions and insights
- ✓ Integrate into audit report

Typical Training and Common Tools in the market

	Introduction to Data Analytics	Intermediate Data Analytics
Example Data Analytics Training Curriculum	❑ Introduce data analytics techniques on data exploration and data profiling ❑ Introduce type of analytics (descriptive, prescriptive and predictive) ❑ Show simple statistical methods to formulas risk driven KPIs which can be leveraged for audit planning ❑ Introduce data visualization concepts	❑ Introduction to scripting and programming ❑ Highlight different data management concepts such as data joins, conditional logic, data transformation that can be applied during testing ❑ Introduce automation concepts including RPA ❑ Provide opportunity to apply experience through a capstone project

	Traditional	Open-Source Scripting	Automation Tools	Visualization
Common Tools in the marketplace	SQL MS Access ACL Excel and VBA SAS	Python R	blueprism UiPath	Tableau MS PowerBI R Shiny

Use Case – Procurement Office (1 / 3)

How a Federal Procurement Office leveraged data analytics to assess controls over the procurement process. Data analytics were used across all three components of the audit / controls assessment – planning, fieldwork and reporting.

Audit Planning

Data Documentation

- ✓ Obtain documentation from business segment owners
- ✓ Identify data sources and assess data availability
- ✓ Develop a data flow diagram to understand at a high level how data moves from different areas and types of applications involved
- ✓ Gain access to data repositories

Data Profiling Planning

- ✓ Work with business auditors to define metrics and potential data exploration activities to identify any trends, outliers (i.e., dollar spend amounts by country, dollar spend by vendor, dollar spend by materials category, total procurement budget, trends over time, sole sourced contracts)
- ✓ Conduct working sessions and walkthroughs with business segment teams to understand different data elements and transformations within scope

Analytics Execution

- ✓ Run high level data quality and integrity check to get some comfort with the available data (i.e., null values, consistency in formatting, control totals where applicable)
- ✓ Design/develop scripts to shape data for analysis
- ✓ Summarize data and develop visualization / presentation

Review Results

- ✓ Review results with business audit team
- ✓ Identify and highlight any potential outliers, anomalies and trends
- ✓ Use findings to help identify any high-risk areas within the audit
- ✓ Document data profiling methodology

Use Case – Procurement Office (2 / 3)

Field Work Testing

Plan data driven tests

- ✓ Work with business auditors to develop analytics driven tests on complete available data population (i.e., check purchase orders against valid vendor contracts, ensure spend does not exceed contractual agreements, identify any orphan purchase orders which do not have an authorized contract agreements, identify contract extensions and extension reasoning, etc.)

Execute Analytics and Review Results

- ✓ Develop test script using open-source platform (R or Python)
- ✓ Ingest procurement data into the model and execute the test scripts
- ✓ Validate reasonableness of the output
- ✓ Review results and findings with business auditors

Document and Finalize

- ✓ Archive test data
- ✓ Document findings and results along with methodology
- ✓ Perform Quality standards review by leadership to ensure data analytics procedures performed conform with defined quality standards and methodology

Use Case – Procurement Office (3 / 3)

Reporting and final work papers

Develop Visualization

- ✓ Develop visualizations in a business intelligence tool (i.e., Tableau / Power BI) to allow business auditors and business owners to have access to interactive test results and findings

Present Visualization with Business Owners

- ✓ Present data driven findings to business owners
- ✓ Share dashboards with business owners to allow them ability to understand identified issues which would potentially assist with remediation or enhancements to their processes

Develop and finalize audit work papers

- ✓ Finalize data analytics components of the audit work paper with business audit team
- ✓ Final review of the audit work papers by leadership to ensure quality

Questions